



# Impacts of Biodiversity Loss on Ocean Ecosystem Services

Victor Portillo de la Osa  
Universitat Autònoma de Barcelona

The increasing impact of human activities on ecosystems biodiversity and its consequences for the services they provide is a matter of growing concern. The real effects of biodiversity on ecosystem functioning (BD-EF) still remain unclear. Investigation providing knowledge to design management policies that assure the viability of ecosystem services through time is needed.

## Objective

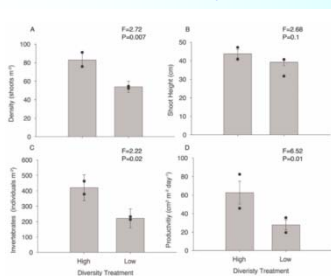
To make a synthesis of the current knowledge about the mechanisms through which biodiversity loss can affect ecosystem services, to give some examples of recent studies on the BD-EF subject, and to identify the difficulties for the investigation and the necessities for future research

## INTRODUCTION

- Ecosystem properties and services are regulated by biological processes depending on species traits and abundances
- Many studies have shown a positive effect of genetic diversity and species richness on EF through:
  - Complementary effects
  - Sampling effects
- Other studies have shown the effects of species identity and food web structure on EF through the traits and strength of the interactions among species
- Identity effects have been shown to be very important in marine systems because of the bias in extinction and invasion patterns among trophic levels
- Recent studies emphasize the importance of the environmental context in regulating the BD – EF relationship.

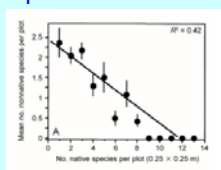
## RESULTS

### Genetic diversity – EF



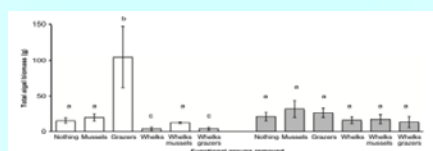
Genetic diversity in *Zostera marina* enhances productivity, shoot density, shoot height and faunal abundance.  
Source: Reynolds et al. (2012)

### Species richness - EF



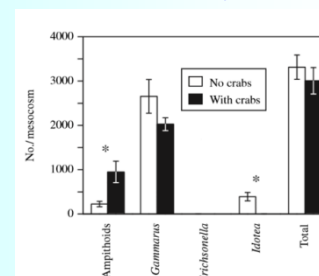
Species richness enhances resistance to invasion in sessile marine invertebrates community.  
Source: (Stachowicz et al. 2002)

### Environmental context - EF



Nutrient poor (white bars) or enriched (grey bars) habitat alters the strength of trophic cascades.  
Source: O'Connor & Donohue (2013)

### Species identity - EF



Predator presence (black bars) or absence (white bars) alters species relative abundances in experimental food web.  
Source: Duffy et al. (2005)

## DISCUSSION

- Genetic diversity may play an important role in habitat forming species by providing stability for the whole community
- Species richness controls ecosystem processes within trophic levels and enhances energy transfer among trophic levels. Its value has been suggested to increase as time passes due to temporal complementarity among species.
- The strength of identity effects in marine systems suggests the importance of identifying and protecting keystone species for maintaining ecosystem services.
- Including environmental data in BD – EF studies may help understand the effects of biodiversity loss in a context of global change

## CONCLUSIONS

- ❖ The real effect of biodiversity loss on ocean ecosystem services is defined by the interactions between genetic diversity, species richness and identity effects in combination with the influence of the environmental context
- ❖ For future research on the subject of biodiversity- ecosystem functioning, better understanding of the composition of natural food webs and the traits and strength of the interactions among species is needed, as well as empirical evidence of how biodiversity loss drivers affect ecosystem function
- ❖ As long as we ignore the real impacts of human activities on ecosystem services, conservative management policies should be applied in order to minimize the effects of these activities on the remaining biodiversity